

# Root/shoot growth effects on yield level and stability in barley cultivar mixtures

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# Root studies in hydroponics

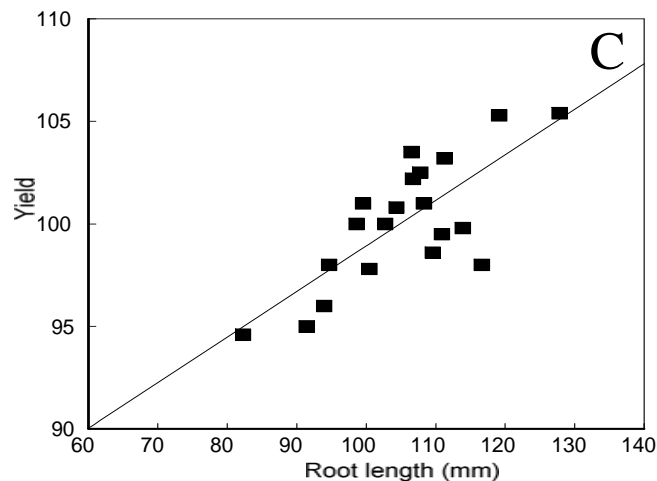
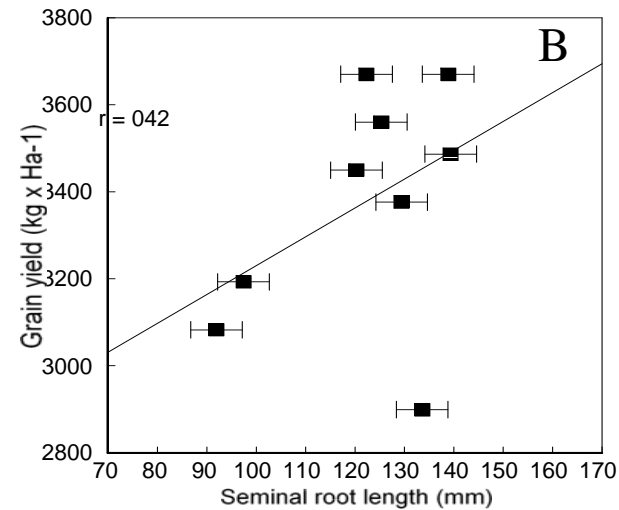
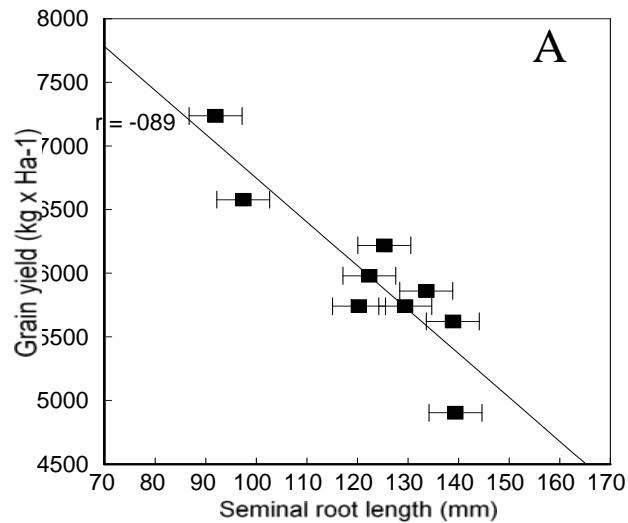


14 day of  
cultivation

New solution  
after one week

No aeration

Relationship between seedling root length and mean grain yield of 10 barley cultivar/lines in area A-C (south of Sweden) a year without early summer drought (A) and with early summer drought (B)



Relationship between seedling root length measured in hydroponics and grain yield from official trials 1999-2005 in Denmark (C). The cultivars are a mixture of Swedish and Danish cultivars.

# Field studies

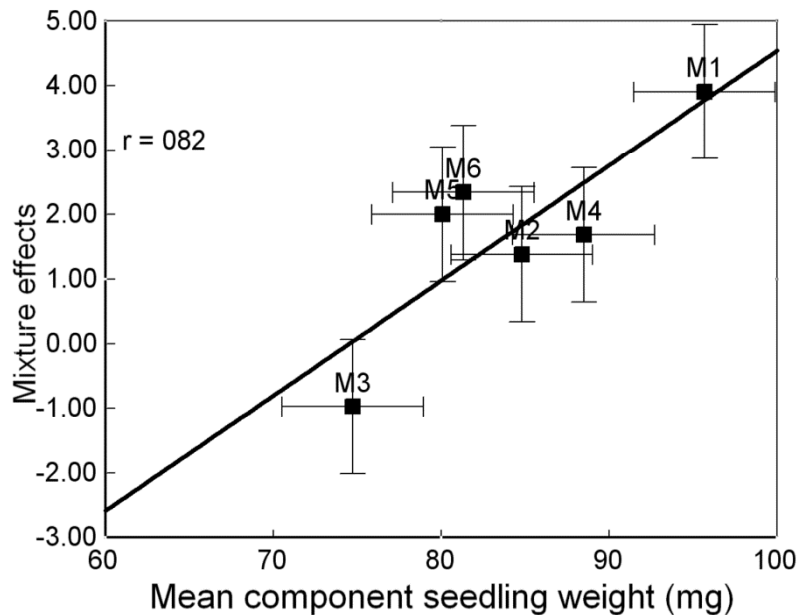
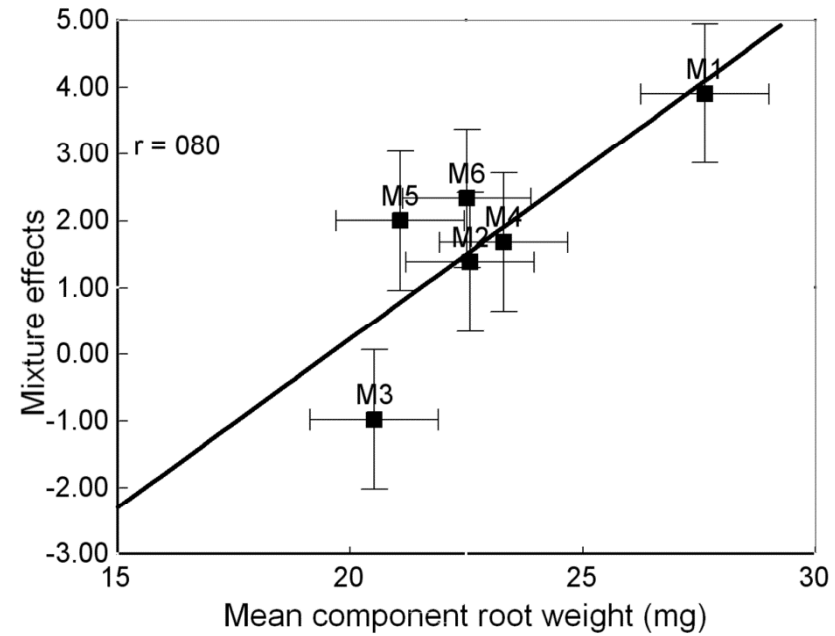
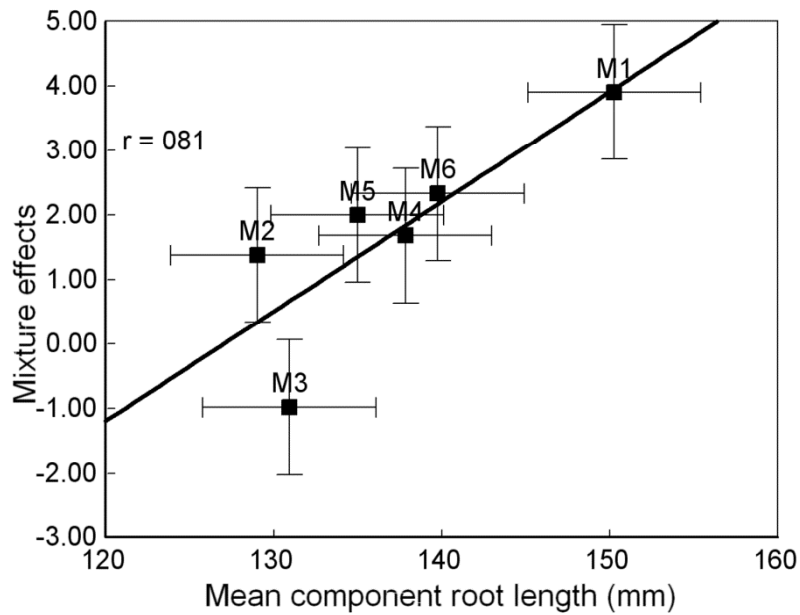
The field data used in this study is the DARCOF II BAR-OF project with six 3-component variety mixtures of spring barley and the component cultivars tested at 20 (18) environments during 2002 – 2005. Most sites were using an “organic” growing system.



Mix 1

and

Mix 2

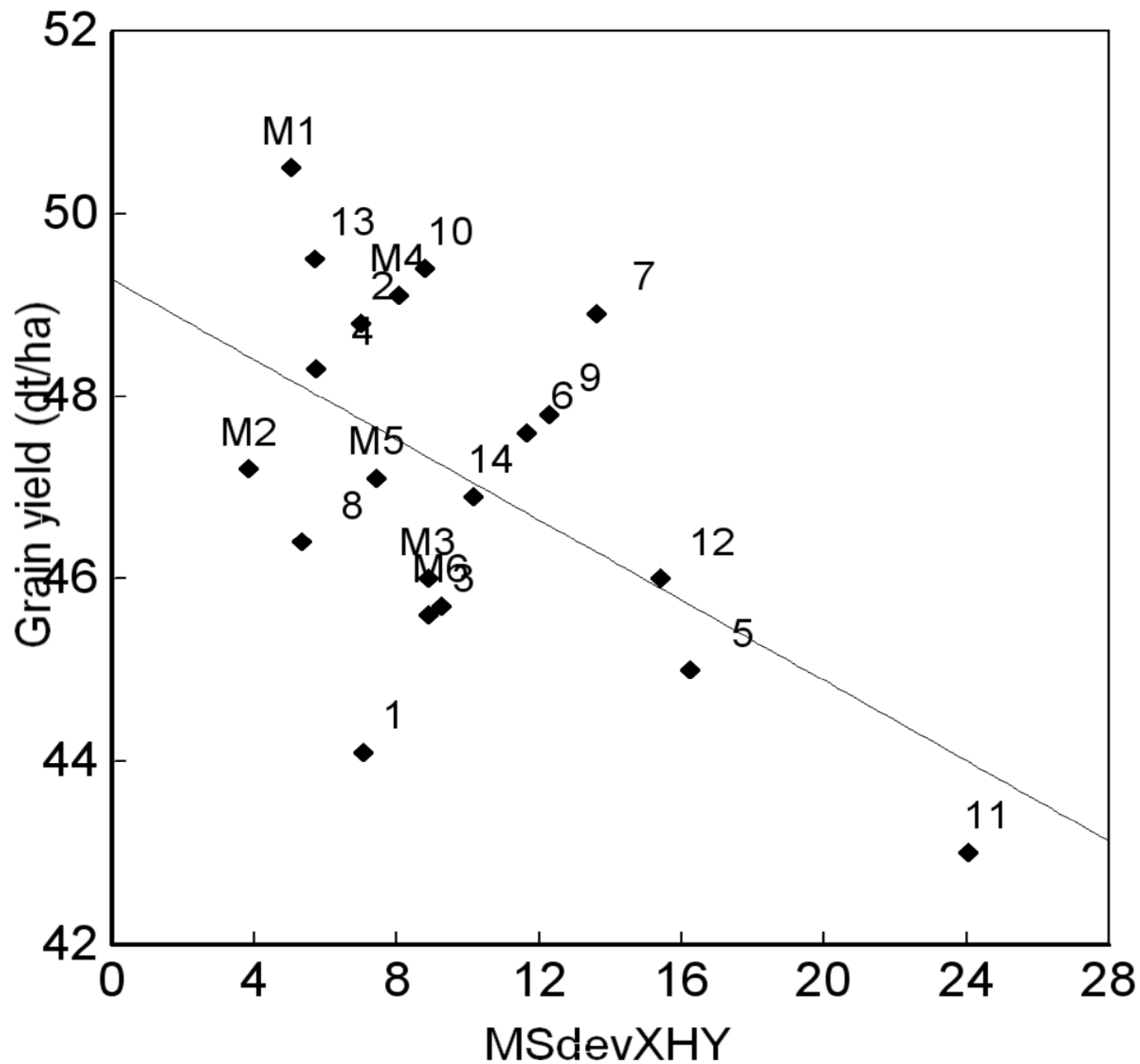


## Mixture effects on yield and root and seedling development

Relative mixture effects = the relative differences between the mixture and the mean value of the components

# Stability Parameters

**MSdevXHY**- the variance of deviation from site highest yield, as described by Jensen (1976) calculated as a measure of static stability. Low value=high stability



M1(2,4,7)

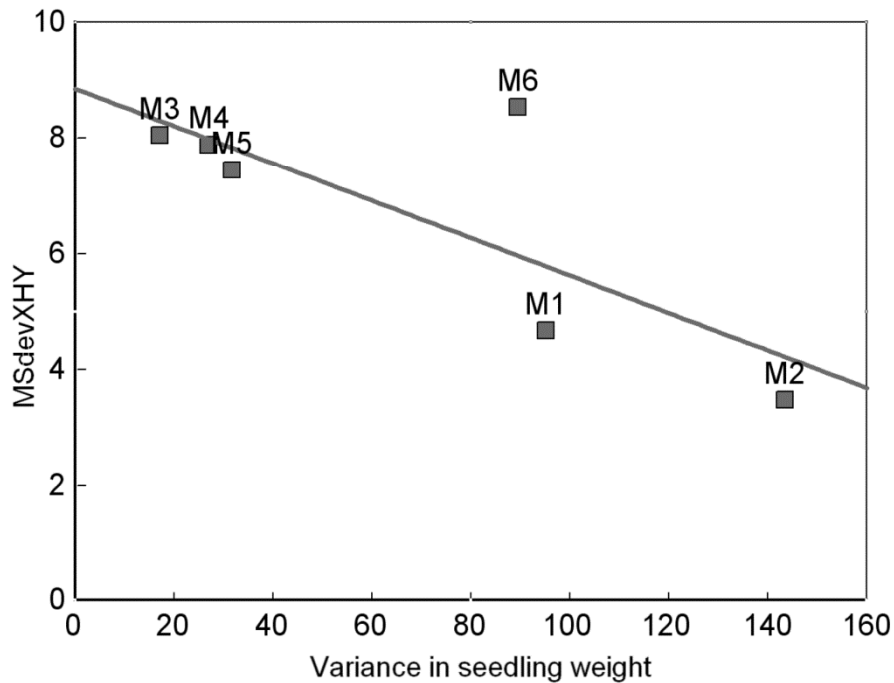
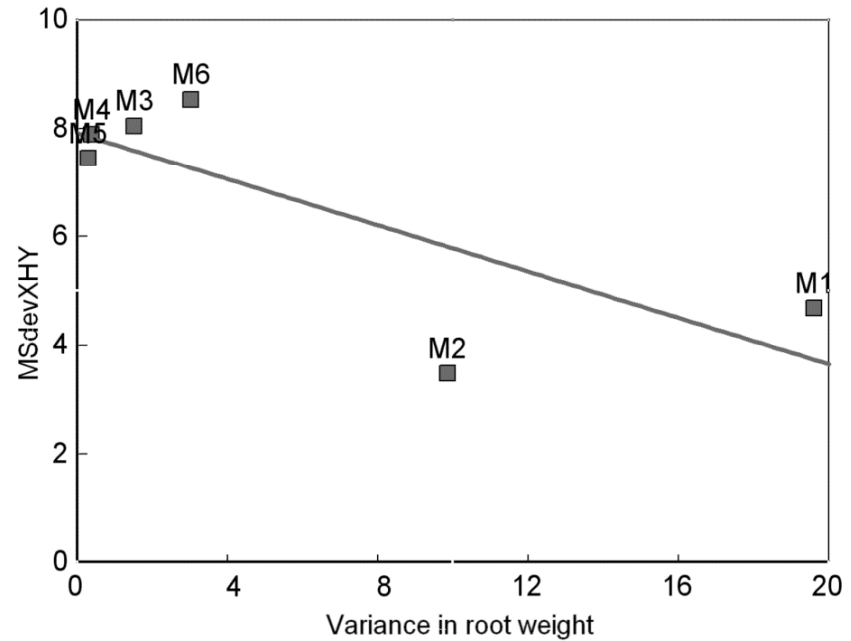
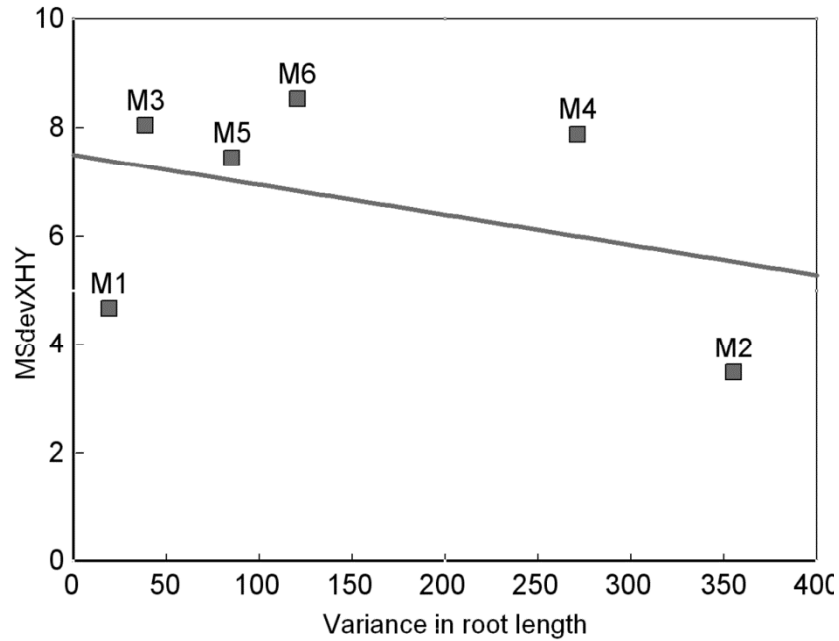
M2 (3,6,14)

M3 (5,8,9)

M4 (4,13,14)

M5 (10,11,12)

M6 (1,6,11)



If the variance of the tree component varieties is high the mixture show a tendency of high yield stability (low MSdevXHY)



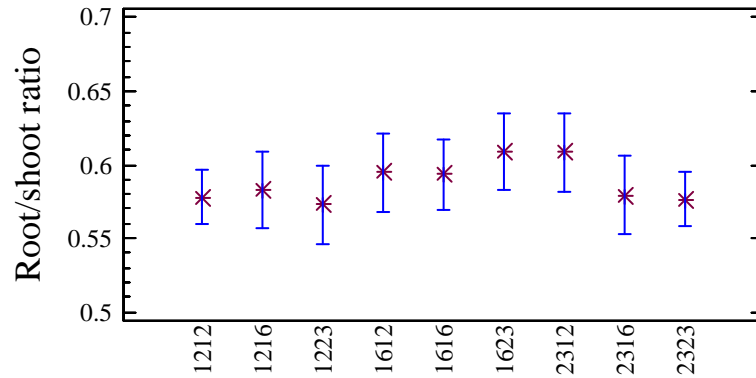


# Allelobiosis studies

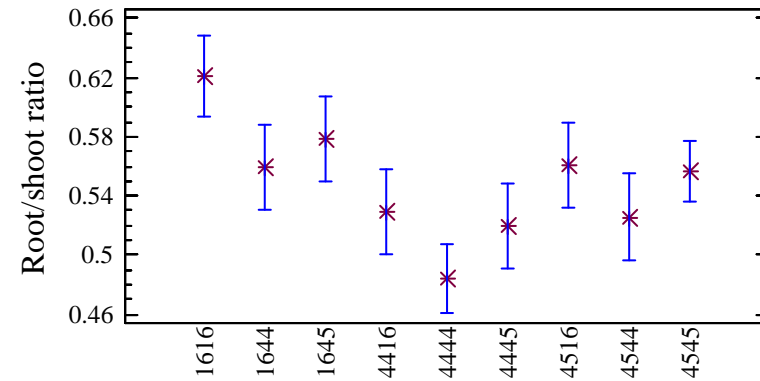
M1=Otira, Orthegea,  
Landora (High stability)  
M4=Orthegea, Brazil,  
Danuta (Low stability)



Föjo no. 1



Föjo no. 4



Otira 12

Brazil 45

Landora 23

Danuta 44

Orthegea 16

Orthegea 16

M1=Otira, Orthegea, Landora (High stability)

M4=Orthegea, Brazil, Danuta (Low stability)

### Result.

The growth allocations between the root and shoot in Orthegea are changes in favour of the shoot in presence of Brazil or Danuta in Föjo no. 4.

# Conclusions

- early growth of both shoot and root (early vigour) of component varieties are important for the yield of mixtures
- variety mixtures are in most cases more stable and high yielding than the average of their components
- There are some tendencies that variations in shoot and root growth (weight) may improve yield stability and with more mixtures included the observed trends may have been significant.
- There could be some interference between component varieties

# Acknowledgements

The Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (Formas), The Danish Research Centre for Organic Farming (DARCOF) and the project members of BAR-OF.

